

CLAIMS

We claim:

1. A radioisotope carrier, comprising:

(a) a stimulus-sensitive gelling polymer in an aqueous solution; and

(b) an aqueous insoluble or confined radioisotope mixed with said gelling polymer as said radioisotope carrier.

2. The radioisotope carrier as recited in claim 1, wherein said gelling polymer is selected from the group consisting of biodegradable polymer, cellulose derivative, agar, gelatin, chitosin, slowly polymerizing alginate gel, gelling copolymer, and combinations thereof.

3. The radioisotope carrier as recited in claim 2, wherein said biodegradable polymer is selected from the group consisting of polysaccharides, polypeptides and combinations thereof.

4. The radioisotope carrier as recited in claim 2, wherein said cellulose derivative is hydroxypropylmethyl cellulose.

5. The radioisotope carrier as recited in claim 2, wherein said gelling copolymer, comprises:

(a) a linear random copolymer in an aqueous solvent, having

(i) an [meth-]acrylamide derivative; and

(ii) a hydrophilic comonomer;

said linear random copolymer in the form of a plurality of linear chains having a plurality of molecular weights

greater than or equal to a minimum gelling molecular weight cutoff; and

(b) the aqueous solvent mixed with said hydrophilic comonomer as a reversible gelling solution.

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6. The radioisotope carrier as recited in claim 5, wherein an amount of said hydrophilic comonomer in the linear random copolymer is less than about 10 mole%.

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7. The radioisotope carrier as recited in claim 6, wherein said amount is about 2 mole%.

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8. The radioisotope carrier as recited in claim 5, wherein said [meth-]acrylamide derivative is an N,N'-alkyl substituted [meth-]acrylamides.

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9. The radioisotope carrier as recited in claim 8, wherein said N,N'-alkyl substituted [meth-]acrylamide is selected from the group consisting of N-isopropyl[meth-]acrylamide, N,N'-diethyl[meth-]acrylamide, N-[meth-]acryloylpyrrolidine, N-ethyl[meth-]acrylamide, and combinations thereof.

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10 The radioisotope carrier as recited in claim 5, wherein said hydrophilic comonomer is hydrophilic [meth-]acryl- compound.

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11. The radioisotope carrier as recited in claim 10, wherein said hydrophilic [meth-]acryl- compound is selected from the group consisting of carboxylic acid, [meth-]acrylamide, hydrophilic [meth-]acrylic acid ester, hydrophilic [meth-]acrylamide derivatives and combinations

thereof.

12. The radioisotope carrier as recited in claim 11,
wherein said carboxylic acid is selected from the group
5 consisting of acrylic acid, methacrylic acid and
combinations thereof.

13. The radioisotope carrier as recited in claim 11,
wherein said hydrophilic [meth-]acrylamide derivatives are
10 selected from the group consisting of N,N-diethyl[meth-]
[acrylamide, 2-[N,N-dimethylamino]ethyl[meth-]acrylamide, 2-
[N,N-diethylamino]ethyl[meth-]acrylamide, or combinations
thereof.

14. The radioisotope carrier as recited in claim 11,
wherein said hydrophilic [meth-]acrylic ester is selected
15 from the group consisting of 2-[N,N-diethylamino]ethyl[meth-]
[acrylate, 2-[N,N-dimethylamino]ethyl[meth-]acrylate, and
combinations thereof.

15. The radioisotope carrier as recited in claim 5,
wherein said aqueous solvent is selected from the group
20 consisting of water, and aqueous salt solution.

16. The radioisotope carrier as recited in claim 15,
25 wherein said salt solution is a phosphate buffered saline.

17. The radioisotope carrier as recited in claim 16,
wherein an amount of said solvent is from about 70 wt% to
30 about 99 wt%.

18. The radioisotope carrier as recited in claim 1,

wherein said radioisotope is selected from the group consisting of yttrium-90, indium-111, radium-223, actinium-225, bismuth-212, bismuth-213, scandium-47, astatine-211, rhenium-186, rhenium-188, iodine-131, iodine-124, lutetium-177, holmium-166, samarium-153, copper-64, copper-67, phosphorus-32 and combinations thereof.

19. The radioisotope carrier as recited in claim 1, wherein said confined radioisotope is selected from the group of chelators, capsules and combinations thereof.

20. The radioisotope carrier as recited in claim 19, wherein said chelators are selected from the group consisting of 1,4,7,10-tetraazacyclododecane-N,N',N'',N'''-tetraacetic acid (DOTA), derivatives of DOTA, tetra-t-butyl-calix[4]arene-crown-6-dicarboxylic acid (TBBCDA), derivatives of TBBCDA, 5,11,17,23-tetra-t-butyl-25,26,27,28-tetrakis(carboxymethoxy)-calix[4]arene (TBTC), derivatives of TBTC, 5,11,17,23,29,35-hexa-t-butyl-37,38,39,40,41,42-hexakis(carboxymethoxy)-calix[6]arene (HBHC), derivatives of HBHC, diethylenetriamine-pentaacetic acid (DTPA), EDTA, derivatives of DTPA, and combinations thereof.

21. The radioisotope carrier as recited in claim 19, wherein said capsules are selected from the group of glass beads, polymer beads and combinations thereof.

22. The radioisotope carrier as recited in claim 1, further comprising a contrast agent.

23. The radioisotope carrier as recited in claim 22, wherein said contrast agent is selected from the group of

gamma-emitting radioisotope, ultrasound contrast enhancing agent, paramagnetic isotope, positron-emitting radioisotope and combinations thereof.

5 24. The radioisotope carrier as recited in claim 23, wherein said gamma-emitting radioisotope is selected from the group of Tc-99m, In-111, Rh-186, Rh-188, Th-201, Ga-67, Y-86, Y-91, I-131, F-18, Cu-64, Cu-67, As-74, Zr-89 and combinations thereof.

10 25. The radioisotope carrier as recited in claim 23, wherein said ultrasound contrast enhancing agent is a plurality of air-filled albumin-coated microspheres, human serum albumin with octofluoropropane.

15 26. The radioisotope carrier as recited in claim 23, wherein said paramagnetic isotope is gadolinium.

20 27. The radioisotope carrier as recited in claim 26, wherein said gadolinium is a chelate selected from the group consisting of gadolinium-DTPA, gadolinium-EDTA and combinations thereof.